

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
18 November 2004 (18.11.2004)

PCT

(10) International Publication Number
WO 2004/100478 A3

(51) International Patent Classification⁷: **H04L 27/34**,
27/38, 1/00, 25/06

(21) International Application Number:
PCT/US2004/013735

(22) International Filing Date: 24 April 2004 (24.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/467,946 5 May 2003 (05.05.2003) US

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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

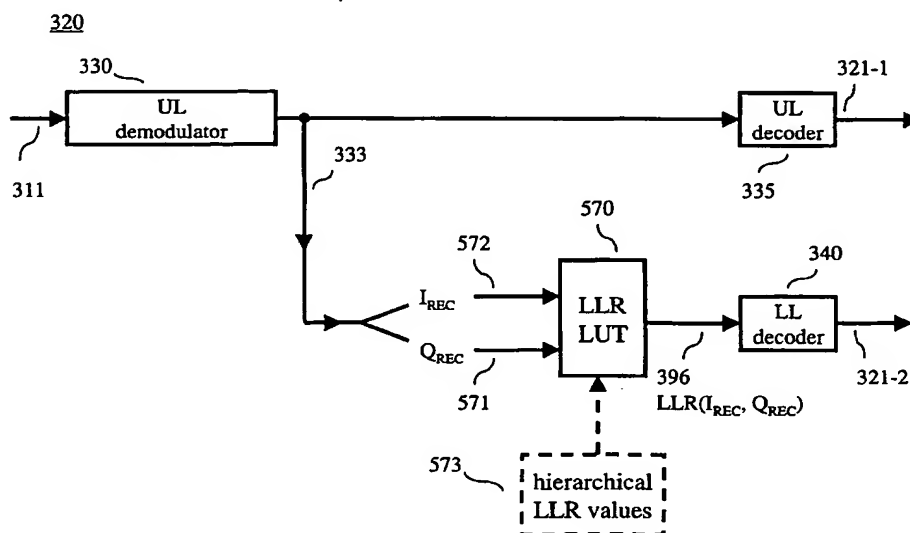
Published:

- with international search report
- with amended claims and statement

(88) Date of publication of the international search report:
19 May 2005

[Continued on next page]

(54) Title: APPARATUS AND METHOD FOR DECODING IN A HIERARCHICAL MODULATION SYSTEM



(57) Abstract: A satellite receiver receives a hierarchical modulation based signal, which has at least an upper layer (UL) and a lower layer (LL), and simultaneously or independently recovers therefrom data conveyed in the UL signal and data conveyed in the LL signal.



Date of publication of the amended claims and statement:
14 July 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

AMENDED CLAIMS

**[Received by the International Bureau on 12 April 2005 (12.04.2005);
original claims 1-19 replaced by amended claims 1-14 (3 pages)]**

1. A method for use in a receiver, the method comprising:
receiving a hierarchical modulation based signal, the hierarchical modulation based
5 signal comprising at least a first signal layer and a second signal layer; and
simultaneously recovering from the received hierarchical modulation based signal data
conveyed in the first signal layer and data conveyed in the second signal layer.

wherein the simultaneously recovering step includes the steps of:

decoding the hierarchical modulation based signal to recover data conveyed in
10 the first signal layer;

generating soft metrics from the hierarchical modulation based signal as a
function of a combined signal space of the hierarchical modulation based signal; and

decoding the hierarchical modulation based signal to recover data conveyed in
the second signal layer as a function of the generated soft metrics.

15 2. The method of claim 1, wherein the first signal layer is an upper signal layer and the
second signal layer is a lower signal layer.

3. The method of claim 1, wherein the soft metrics are log-likelihood ratios.

20 4. The method of claim 1, wherein the combined signal space is a combination of a
signal space of the first signal layer and a signal space of the second signal layer.

5. The method of claim 1, wherein the generating step includes the step of using the
25 hierarchical modulation based signal as an index into a look-up table of soft metrics.

6. A method for use in a receiver for receiving a hierarchical modulation based signal
comprising at least a first signal layer and a second signal layer, the method comprising:

receiving a training signal from an endpoint;

30 calculating soft metric values as a function of a combined signal space and the
received training signal, wherein the combined signal space is a combination of a signal space
of the first signal layer and a signal space of the second signal layer; and

storing the calculated soft metric values in a look-up table.

7. The method of claim 6, further comprising:
receiving the hierarchical modulation based signal;
decoding the hierarchical modulation based signal to recover data conveyed in the first
signal layer; and

5 decoding the hierarchical modulation based signal to recover data conveyed in the
second signal layer as a function of the stored metric values.

8. The method of claim 7, wherein the soft metric values are log-likelihood ratios.

10 9. A receiver comprising:

a demodulator for demodulating a received signal to provide a hierarchical modulation
based signal comprising at least two signal layers;

a first decoder operative on the hierarchical modulation based signal for decoding one
of the at least two signal layers to provide data therefrom;

15 a second decoder for providing data from the other of the at least two signal layers,
wherein the second decoder operates independently of the first decoder; and

a look-up table for storing therein soft metrics, wherein the soft metrics are determined
as a function of a combined signal space of the at least two signal layers and wherein the look-
up table provides the soft metrics to the second decoder for use therein for providing the data
20 from the other of the at least two signal layers.

10. The receiver of claim 9, wherein the at least two signal layers include an upper
signal layer and a lower signal layer.

25 11. The receiver of claim 9, wherein the soft metrics are log-likelihood ratios.

12. Apparatus comprising:

a television set for displaying video content; and

a receiver coupled to the television set for receiving a hierarchical modulation based
30 signal conveying the video content, wherein the receiver simultaneously decodes at least two
signal layers of the received hierarchical modulation based signal for providing the video
content to the television set;

wherein the receiver includes a look-up table for storing soft metrics, which are
determined as a function of a combined signal space of the at least two signal layers.

13. The apparatus of claim 12, wherein the received hierarchical modulation based signal is a satellite signal.

5 14. The apparatus of claim 12, wherein the soft metrics are log-likelihood ratios.

STATEMENT

With respect to the original claims, claims 18 and 19 have been canceled. Original independent claims 1, 10 and 14 have been amended to include the requirements of dependent claims 3, 12 and 16, respectively. The claims have been

renumbered where necessary and minor amendments have been made to improve their form. In particular, on the attached substitute sheets:

- Claim 1 corresponds to a combination of original claims 1 and 3;
- Claims 2 to 5 correspond to original claims 2, 4, 5 and 6, respectively;
- Claims 6 to 8 corresponds to original claims 7 to 9, respectively;
- Claim 9 corresponds to a combination of original claims 10 and 12;
- Claims 10 and 11 correspond to original claims 11 and 13, respectively;
- Claim 12 corresponds to a combination of original claims 14 and 16; and
- Claims 13 and 14 correspond to original claims 15 and 17, respectively.